

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTONSTUDIES OF NEOTROPICAL CADDISFLIES, XIX:
THE GENUS *CAILLOMA* (TRICHOPTERA:
RHYACOPHILIDAE)

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All of the 17 recognized Neotropical genera of Rhyacophilidae belong to the subfamily Hydrobiosinae, a subfamily which also occurs in southern and eastern Asia, Fiji, Australia, Solomon Islands, New Caledonia, and New Zealand. The larvae of all species are free-living, and, as far as is known, predaceous and rheophilic.

One genus, *Atopsyche*, is known from the southwestern United States, south throughout Central and South America, including the Greater Antilles, and as far south as the Province of Catamarca in Argentina. Yet this genus has not been collected, and probably does not occur, in Chile or southern Argentina. Conversely, 14 of the 16 remaining genera are strictly limited to these southernmost regions of Chile and Argentina. Of the remaining 2 genera, *Iguazu* is known from outside Chile by only 1 specimen labelled Misiones, Argentina, that may be mislabelled. This genus, then, is most likely limited also to the Chilean Subregion. The other genus, *Cailloma*, actually has a distribution that broadly overlaps the two Neotropical subregions. Examples of this genus have been collected near the eastern tip of Isla de los Estados (Staten Island) off the tip of Tierra del Fuego, and north along the Andes at least into Ecuador. Why *Atopsyche*, whose larvae may occur on the same rock as those of *Cailloma* in northern Argentina, has not been able to accomplish the same bridging of the two Subregions, remains unanswered.

I have frequently collected adults and immatures of this genus in my travels in Chile, especially during my most recent visit in Argentina in 1973. In fact, a special trip was taken to Mendoza for the primary purpose of collecting additional material of the unrecognizable *Cailloma lucidula* (Ulmer), the results of which are summarized in the discussion under this species. As a result I now possess larvae and pupae, males and females, of all 3 known species of this genus. This paper, then, brings together illustrations, keys, distributions, and new synonymies in the genus *Cailloma*.

I wish to thank Prof. Dr. H. Weidner for the loan of the type of *Cailloma lucidula* (Ulm.), and Dr. J. Unzicker for the loan of the type of *C. brunosa* Ross & King. Mr. L. M. Druckenbrod prepared the excellent illustrations of the larval heads and pronota.

Genus *Cailloma* Ross & King

Cailloma Ross & King, 1951, p. 507.—Ross, 1951, p. 112; 1953, p. 154; 1956, p. 125.—Flint, 1971, p. 12.—Fischer, 1971, p. 149.

Genus A Flint, 1963, p. 463; 1971, p. 12.

Type species: *Cailloma brunosa* Ross & King (= *lucidula* Ulmer).

Adult: Spurs 2,4,4. Venation nearly identical in both sexes, except that the discal cell in the forewing of the female is typically longer than in the male. Forewing with R_{2+3} branched well beyond s, R_{4+5} branched at s; M_{1+2} and M_{3+4} both branched about midway to wing margin. Hindwing with R_{2+3} apparently arising from R_4 with cell Cu_{1b} considerably inflated. Abdomen without lateral processes; seventh sternum of both sexes with a small wart bearing enlarged setae. Male genitalia with cercus small, filicercus elongate, paracercus short; clasper one-segmented; aedeagus short, simple, with a single internal spine. Female genitalia not produced into an elongate ovipositor.

Larva: Mandibles with a single tooth on dorsal carina, ventral carina lacking on right mandible, a simple ridge on left. Head $\frac{3}{4}$ as wide as long. Prosternum with sclerite small, $\frac{1}{4}$ to $\frac{1}{5}$ as wide as distance between legs. Foreleg with apicoventral process of femur short and slender; tibia and tarsus fused. Mid and hindlegs similar in size and structure; claw with basal seta short, broad, and curved. Lateral sclerite of anal proleg $1\frac{1}{2}$ times as long as broad; claw without ventral teeth, but with basoventral seta broad and curved.

Pupa: Mandibles curved; inner margin serrate with larger teeth at midlength. Hook plates anteriorly on segment 2 to 6 or 7, not raised

above body surface, each with many small teeth; posterior plates on segments 4 and 5, each broader than long, low, and with many small teeth.

Recognition: The adults of the genus are easily recognized by their venation, especially the short apical forks of R_{2+3} , M_{1+2} , and M_{3+4} in the forewing and the apparent origin of R_{2+3} from R_4 in the hindwing. The other genera that may be confused with *Cailloma* on the basis of venation are *Parachorema*, *Stenochorema*, and *Nolganema*. The males of the first 2 genera possess a narrow reflexed costal cell and lack all vestiges of crossveins in the forewing. In addition, the claspers in the males of *Parachorema* are clearly 2-segmented and in *Stenochorema* possess a basal complex. The genus *Nolganema* Navas is not fully recognizable from the original description, but clearly falls into this complex of genera. Navas does state however, that the type possesses sternal processes, which are lacking in *Cailloma* but present in some degree in the other genera.

The larvae of few Neotropical Hydrobiosines have been described, but based on undescribed material in the collection here, the following characteristics will probably serve for recognition of the larvae of *Cailloma*: presence of a single dorsal tooth and reduction of ventral cutting edges of mandibles; shape and structure of forelegs, especially fusion of tibia and tarsus; very small size of prosternal sclerite; modification of basal setae of mid and hind legs; and short lateral plate of anal prolegs, whose claw lacks ventral teeth and possesses a modified basal seta.

The larvae described as genus A from Ecuador in 1963 are clearly those of a species of *Cailloma*. They are in an early instar, at which time the pronotal halves are fused and the head spots discrete. Early instar larvae in any collection that I examined have the appearance of these from Ecuador, thus they cannot be identified to species at this time.

In general, characteristics of the mandibles, hook plates, and apical lobe offer the best characteristics for recognition of the pupae whenever recognition has been possible.

Biology: Immatures of the species in this genus are commonly found on and under the rocks in cold, rather small streams in the Andes. *C. lucidula* (Ulm.) is a dominant, and at times exclusive, inhabitant of small, tumbling, brooks of the puna grassland areas of Tucuman and Mendoza, Argentina (and probably similar areas in the other north-western provinces). Dr. Spangler informs me that the stream near Cochabamba, Bolivia, was 1 to 2 meters wide, with riffles but at a rather low gradient and also in the puna. According to Dr. Hodges, the two Ecuadorian localities where small larvae were taken were also of similar nature and in the paramo, a similar low-type vegetation zone of high elevations.

However, many of the collection sites in southern Chile and Argentina are in the *Nothofagus* forest, which characteristic is especially true for

C. rotunda Flint. Two sites in southern Chile near Punta Arenas are most instructive in this connection. One site, collected on Jan. 10, 1965 was at an elevation where the forest was well developed with the small stream, slightly over a half meter wide, flowing in and alongside the forest. The site collected on Feb. 26, 1966 was at a slightly lower elevation, in open grassland. At the first site only *C. rotunda* Flint was taken, at the second only *C. pumida* Ross. Yet, one night in central Chile at the fish hatchery at Río Blanco males of all three species came to the light. There are, however, many springs and streams up to several meters in width in the vicinity, some of which are shaded by trees planted at the fish hatchery, others in the more open, natural scrub-type vegetation. It is thus still possible for some degree of ecological difference in the breeding sites at this one locality.

KEY TO SPECIES, ADULTS

1. With claspers and aedeagus (males) 2
Without these structures (females) 4
2. Clasper broadest subapically, apex nearly round *rotunda* Flint
Clasper narrowing apicad, apex bluntly pointed 3
3. Apicoventral lip of aedeagus produced into a long narrow point
..... *lucidula* (Ulmer)
Apicoventral lip of aedeagus broad and bluntly bifid *pumida* Ross
4. Midventral membranous process of ninth sternum greatly surpassing apex of ninth tergum *rotunda* Flint
Midventral process only attaining apex of ninth tergum
..... *lucidula* (Ulmer) & *pumida* Ross

KEY TO SPECIES, LARVAE

1. Head with frontoclypeus unmarked anteriorly *rotunda* Flint
Head with frontoclypeus bearing a dark transverse bar or with dark lateral spots anteriorly *lucidula* (Ulmer) & *pumida* Ross

KEY TO SPECIES, PUPAE

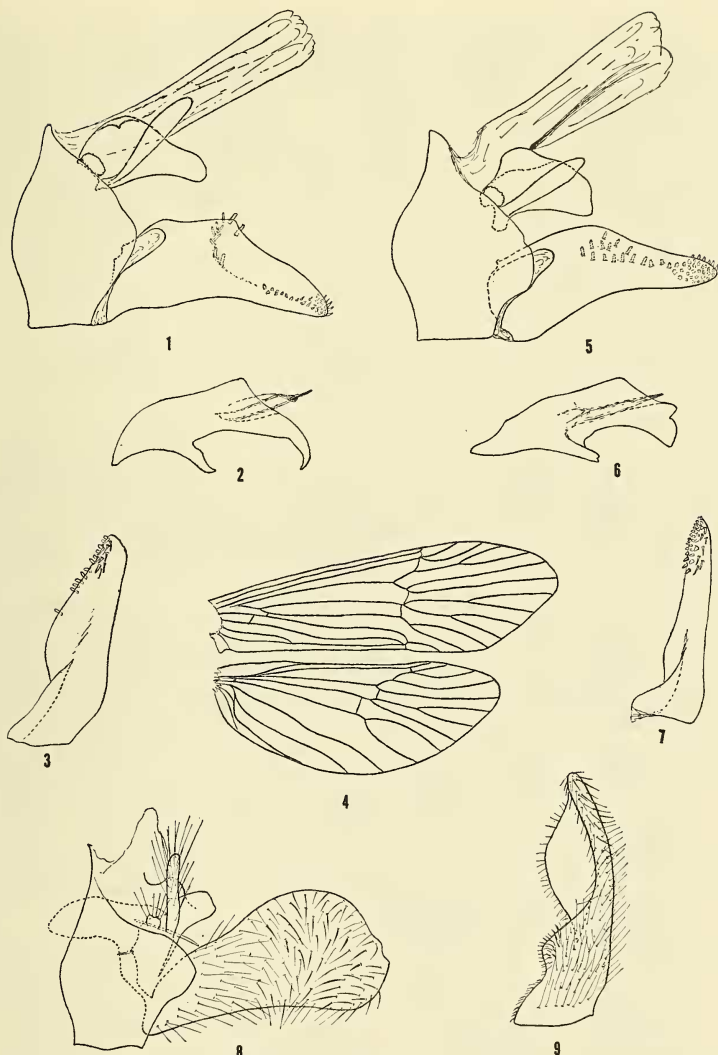
1. Hook plate 6A about twice as wide as long; without 3 large apicolateral setae on apical lobe *rotunda* Flint
Hook plate 6A about as wide as long; apical lobe with 3 large setae apicolaterally *lucidula* (Ulmer) & *pumida* Ross

Cailloma lucidula (Ulmer)

Figures 1-4, 12-17, 19, 21-26

Atopsyche lucidula Ulmer, 1909, p. 73; 1913, p. 404.—Jørgensen, 1919, p. 392.—Fischer, 1960, p. 161.

Cailloma lucidula (Ulm.).—Ross & King, 1951, p. 507.—Ross, 1956, p. 125.—Fischer, 1971, p. 149.



FIGS. 1-9. *Cailloma lucidula* (Ulmer): 1, male genitalia, lateral; 2, aedeagus, lateral; 3, clasper, ventral; 4, wings. *C. pumida* Ross: 5, male genitalia, lateral; 6, aedeagus, lateral; 7, clasper, ventral. *C. rotunda* Flint: 8, male genitalia, lateral; 9, clasper, ventral.

Cailloma brunosa Ross & King, 1951, p. 507.—Ross, 1956, p. 125.—Fischer, 1971, p. 149. [NEW SYNONYMY].

Cailloma angustipennis Schmid, 1955, p. 122.—Fischer, 1971, p. 149.—Knutson & Flint, 1971, p. 315. [NEW SYNONYMY].

Through the kindness of Prof. Dr. Weidner, I have been able to clear and study the type female of *A. lucidula* Ulmer. It is absolutely typical of the complex containing this species and *C. pumida* Ross, the females of which I am unable to tell apart. I visited the type locality of Potrerillos, Mendoza, Argentina within a few days of the day of the year of the collection of the type in the hope of collecting additional material which would permit the resolution of this problem. I found larvae and pupae commonly in the small streams above Potrerillos, and obtained adults at the light on several nights. All the male metamorphotypes and adult males, save one, pertain to the species previously known as either *C. brunosa* Ross & King or *C. angustipennis* Schmid. There is one adult male of *C. pumida* Ross in the collection. Therefore, on the overwhelming preponderance of this species at the type locality near the date of collection of the type, I identify the type of *A. lucidula* with the species here treated.

I have studied the type of *C. brunosa* Ross & King, loaned by the Illinois Natural History Survey and returned to the Field Museum of Natural History (FMNH), and *C. angustipennis* Schmid, located at the National Museum of Natural History (USNM). They are clearly conspecific with *C. lucidula*, which shows little variation over its extensive range.

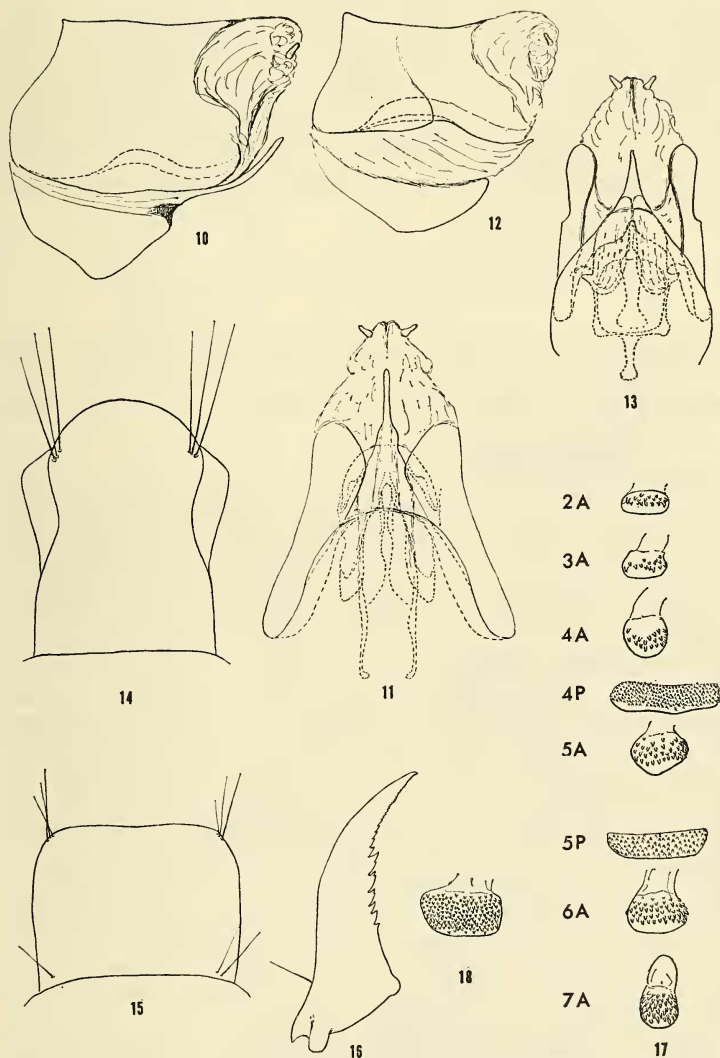
This species and the following, *C. pumida* Ross, are separable with certainty only in the male sex; the females, larvae, and pupae seem to be identical in the two species. The aedeagus, which offers the surest means of recognition, has its apicoventral lip drawn out into a long slender point in *C. lucidula*, but in *C. pumida* the lip is broader and bluntly bifid. In addition the clasper is broader apically and in dorsal aspect bears a smooth, slightly cupped dorsomesal area in *C. lucidula*.

Material: PERU: San Ignacio, Cailloma, 1 Sept. 1939, K. P. Schmidt, ♂ holotype of *C. brunosa* Ross & King (FMNH).

BOLIVIA: COCHABAMBA; 48 km north of Cochabamba, 8490' (2570 m), 10 May 1969, P. & P. Spangler, 45 larvae, 4 prepupae, 7 pupae, 1 ♂ 2 ♀ metamorphotypes.

ARGENTINA: TUCUMAN; Rt. 307, La Angostura, 1850 m, 11 Oct. 1973, O. S. Flint, Jr., 1 ♂ 2 ♀, 1 larva. Rt. 307, km 76, west of Tafi del Valle, 2600 m, 11 Oct. 1973, O. S. Flint, Jr., 1 larva, 5 prepupae, 6 pupae, 1 ♂ metamorphotype. Rt. 307, Abra de Infiernillo, 2970 m, 11 Oct. 1973, O. S. Flint, Jr., 17 larvae. Camino a Amaichá (Rt. 307) km 92, 31 Oct. 1964, Teran, 1 ♀ (Inst. Lillo). Rt. 307, km 97.5, Los Cardones, 2700 m, 11 Oct. 1973, O. S. Flint, Jr., 1 prepupa, 5 pupae, 2 ♂ 1 ♀ metamorphotypes.

MENDOZA; Potrerillos, 26 Dec. 1907, P. Jørgensen, ♀ holotype of *A. lucidula* Ulmer (Hamburg Mus.). 4 km south of Potrerillos, 1450 m, 18 Dec. 1973, C. M. & O. S. Flint, Jr., 20 larvae, 2 prepupae, 7 pupae, 2 ♂ 1 ♀ metamorphotypes. Río Blanco, 10 km south of Potrerillos, about 1500 m, 18 Dec. 1973, C. M. & O. S. Flint, Jr., 9 larvae, 6 prepupae,



FIGS. 10-18. *Cailloma rotunda* Flint: 10, female genitalia, lateral; 11, female genitalia, ventral. *C. lucidula* (Ulmer): 12, female genitalia, lateral; 13, female genitalia, ventral; 14, apical lobe of male pupa, dorsal; 15, apical lobe of female pupa, dorsal; 16, pupal mandible, dorsal; 17, pupal hook plates, dorsal. *C. rotunda* Flint: 18, pupal hook plate 6A, dorsal. (A = anterior, P = posterior, 2-7 = segment number).

16 pupae, 6♂ 5♀ metamorphotypes. Above El Salto, southwest of Potrerillos, about 1600, m, 20 Dec. 1973, C. M. & O. S. Flint, Jr., 21♂ 4♀, 10 larvae, 16 prepupae, 25 pupae, 3♂ 4♀ metamorphotypes.

CHILE: COQUIMBO; Las Hedionditas, 10 Jan. 1966, L. E. Pena G., 1♂ 2♀. ACONCAGUA; Río Blanco, 10 Mar. 1968, Flint & Pena, 3♂. SANTIAGO; El Alfalfal, 29 Feb. 1968, Flint & Pena, 1♂. El Manzano, 26 Oct. 1951, L. E. Pena G., ♂ holotype *C. angustipennis* Schmid (USNM).

Cailloma pumida Ross

Figures 5-7, 27

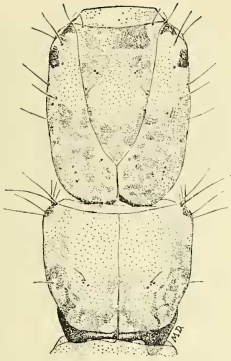
Cailloma pumida Ross, 1956, p. 125.—Schmid, 1958, p. 190.—Flint, 1967, p. 45.—Knutson & Flint, 1971, p. 315.—Fischer, 1971, p. 149.

Cailloma erinaceus Schmid, 1957, p. 382; 1958, p. 190.—Fischer, 1971, p. 149.

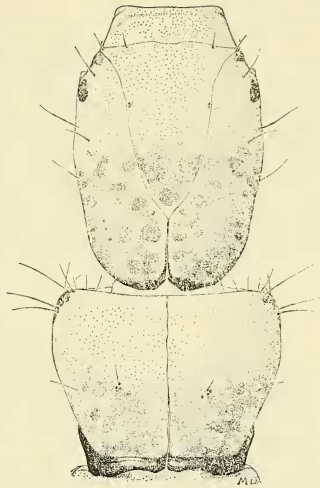
Cailloma pumida Ross is very similar to *C. lucidula* (Ulm.); indeed, I am able to tell only the males apart. However, I have collected males of both these as well as *C. rotunda* Flint together, indicating an absolute sympatry and validity of the species. The characters differentiating males of the former two species are discussed under *C. lucidula*.

Material: ARGENTINA: MENDOZA; Río Blanco, 8 km south of Potrerillos, 18 Dec. 1973, C. M. & O. S. Flint, Jr., 1♂. NEUQUEN; Río Quilquihué, at Quilquihué, 26 Jan. 1974, O. S. Flint, Jr., 5♂ 2♀. Río Quilquihué, at Lago Lolog, 22-23 Jan. 1974, O. S. Flint, Jr., 2 prepupae. Arroyo Cordoba Grande, at Caleufu, 3 Feb. 1974, O. S. Flint, Jr., 1 larva, 1 prepupa. Río NEGRO; Arroyo Nireco, near San Carlos de Bariloche, 5 Mar. 1957, J. Illies, 4♂; same, but 31 Dec. 1957, 3♂; same, but 3 May 1958, L. E. Pena G., 5♂ 2♀; same, but 26 May 1958, 1♂; same, but 17 June 1958, 1♂; same, but 15 Oct. 1958, 1♂. Lago Nahuel Huapi, near Arroyo Nireco, San Carlos de Bariloche, 25 Sept. 1957, J. Illies, 1♂, 1♂ metamorphotype. Río Nirihuau, at Estacion Nirihuau, 11 Feb. 1974, O. S. Flint, Jr., 1♂ 1♀. Brook 5 km south of Río Villegas, 7 Feb. 1974, O. S. Flint, Jr., 5 larvae, 1♂ 1♀ metamorphotypes. Cascada Mallin Ahogado, near El Bolsón, 9 Feb. 1974, O. S. Flint, Jr., 2♂, 3♀, 2 larvae. CHUBUT; Río Epuyen, near Hoyo de Epuyen, 10 Feb. 1974, O. S. Flint, Jr., 1♀, 4 larvae, 2 prepupae.

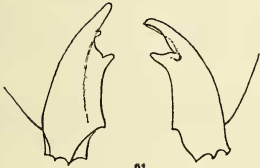
CHILE: COQUIMBO; Los Molles, 1 Oct. 1967, L. E. Pena G., 1♂ 1♀. Canela Baja, 23-24 Oct. 1961, L. E. Pena G., 1♂. Rivadavia, 16 May 1952, L. E. Pena G., 1♂. ACONCAGUA; Los Andes, 12 Nov. 1957, J. Illies, 1♂. Río Blanco, 10 Mar. 1968, Flint & Pena, 1♂. SANTIAGO; El Alfalfal, 29 Feb. 1968, Flint & Pena, 2♂. O'HIGGINS; La Leonera, 26-28 Dec. 1954, L. E. Pena G., 2♂ 5♀ including ♂ holotype ♀ allotype of *C. erinaceus* Schmid (USNM). NUBLE; Las Trancas, 10-11 Feb. 1956, L. E. Pena G., 1♂. CHILOE; Ancud, 6 Jan. 1952, L. E. Pena G., 1♂. MAGALLANES; Tributary to Río de las Minas, at water supply in-



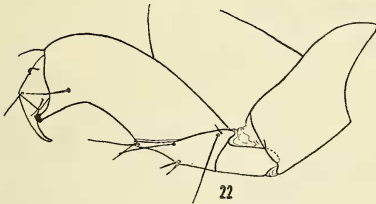
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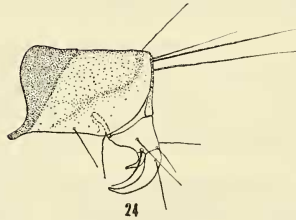
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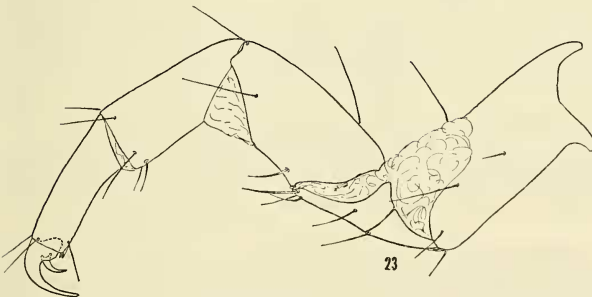
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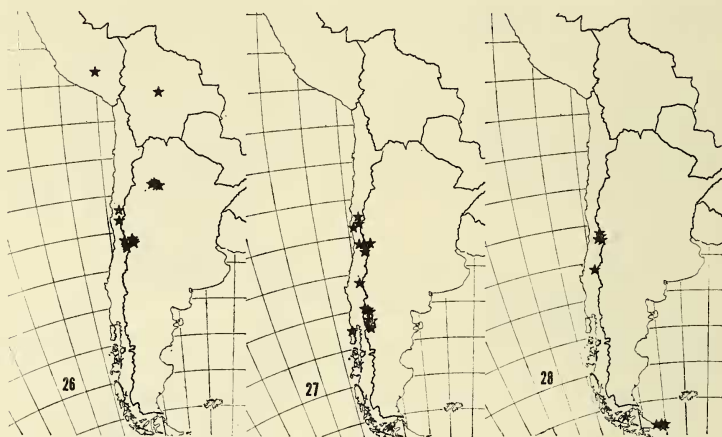


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FIGS. 19-25. *Cailloma lucidula* (Ulmer): 19, larval head and pronotum, dorsal. *C. rotunda* Flint: 20, larval head and pronotum, dorsal. *C. lucidula* (Ulmer): 21, larval mandibles, dorsal; 22, larval foreleg, posterior; 23, larval hindleg, posterior; 24, larval anal proleg, lateral; 25, larval prosternite, ventral.



FIGS. 26–28. Recorded distribution of: 26, *Cailloma lucidula* (Ulmer); 27, *C. pumida* Ross; 28, *C. rotunda* Flint.

take above Punta Arenas, 26 Feb. 1966, O. S. Flint, Jr., 1 larva, 9 prepupae, 66 pupae, 3 ♂ metamorphotypes.

Cailloma rotunda Flint

Figures 8–11, 18, 20, 28

Cailloma rotunda Flint, 1967, p. 46.—Knutson & Flint, 1971, p. 315.

This recently described species is only distantly related to the other two species of *Cailloma*. The male is easily recognized by the very broad and rounded claspers and the differently shaped paracercus and aedeagus. The female genitalia also are diagnostic, especially the much longer mesal process from the ninth sternum and the general shape and structure of the vagina and associated supports. The larva is less certainly determined, but lacks all dark marks anteriorly on the frontoclypeus, which marks appear to be present in some degree on the other species. The pupa of *rotunda* is easily recognized by the reduction or loss of the hook-plate on 7A and the general increase in size of the other plates, as well as the loss of the 3 pairs of long setae on the apical lobe.

Material: ARGENTINA: TIERRA DEL FUEGO; Bahía Buen Suceso, 23–26 April 1971, Flint & Hevel, 1 ♂ 2 ♀. Isla de los Estados, Bahía Crossley, 26–30 April 1971, Flint & Hevel, 2 prepupae, 17 pupae, 1 ♂ 1 ♀ metamorphotypes. Isla de los Estados, Bahía Capitan Canepa, 1–3 May 1971, Flint & Hevel, 5 larvae, 1 prepupae, 1 ♂ 1 ♀ metamorphotypes. Isla de los Estados, Bahía Blossom, 10 May 1971, Flint & Hevel,

1 prepupa. Isla de los Estados, Puerto Ano Nuevo, 19 May 1971, Flint & Hevel, 1 larva, 5 pupae, 1 ♂ metamorphotype.

CHILE: ACONCAGUA; Río Blanco, 10 Mar. 1968, Flint & Pena, 1 ♂. SANTIAGO; El Alfalfal, 29 Feb. 1968, Flint & Pena, 1 ♂; same, but 12–13 Oct. 1969, Flint & Barria, 1 ♀. Near Los Valdes, 4000 m, 25 Mar. 1958, J. Illies, ♂ holotype (USNM). Near Banos Morales, 2000 m, 25 Mar. 1958, J. Illies, 1 ♂. Los Valdes, tributary to Río Volcan, 7 Mar. 1958, J. Illies, 4 larvae. NUBLE; 2.7 km north of Las Trancas, 27 Jan. 1967, Irwin & Stange, 2 ♂. MAGALLANES; Tributary to Río de las Minas, 14 km north of Punta Arenas, 10 Jan. 1966, Flint & Cekalovic, 13 larvae, 8 prepupae, 13 pupae, 3 ♂ 3 ♀ metamorphotypes.

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